

## DESCRIPTION AND RATING

The 6DT6 is a miniature sharp-cutoff dual-control pentode primarily intended for use as an FM detector in television receivers. It is also suitable for use in delay circuits, gain-controlled amplifier circuits, and mixer circuits.

As an FM detector, the 6DT6 performs the combined functions of limiter and detector when used in conjunction with suitable circuitry. It also exhibits high sensitivity, and is capable of providing high audio output voltage.

Except for heater ratings, the 3DT6 and 4DT6 are identical to the 6DT6. In addition, they incorporate a controlled heater warm-up characteristic, which makes them especially suited for use in television receivers that employ series-connected heaters.

### GENERAL

#### ELECTRICAL

	3DT6	4DT6	6DT6
Cathode—Coated Unipotential			
Heater Voltage, AC or DC	3.15	4.2	6.3 Volts
Heater Current	0.6	0.45	0.3 Amperes
Heater Warm-up Time*	11	11	... Seconds
Direct Interelectrode Capacitances, approximate†			
Grid-Number 1 to Plate			0.02 $\mu\text{f}$
Grid-Number 3 to Plate			1.4 $\mu\text{f}$
Grid-Number 1 to All Except Plate			5.8 $\mu\text{f}$
Grid-Number 3 to All			6.1 $\mu\text{f}$
Grid-Number 1 to Grid-Number 3			0.1 $\mu\text{f}$

#### MECHANICAL

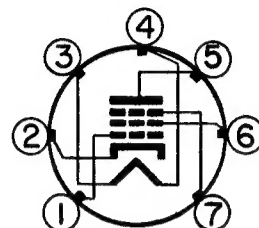
Mounting Position—Any  
Envelope—T-5½, Glass  
Base—E7-1, Miniature Button 7-Pin

### MAXIMUM RATINGS

#### FM DETECTOR SERVICE—DESIGN-CENTER VALUES

Plate Voltage	300 Volts
Suppressor Voltage	25 Volts
Screen-Supply Voltage	300 Volts
Screen Voltage—See Screen Rating Chart	
Positive DC Grid-Number 1 Voltage	0 Volts
Plate Dissipation	1.5 Watts
Screen Dissipation	1.0 Watts
Heater-Cathode Voltage	
Heater Positive with Respect to Cathode	
DC Component	100 Volts
Total DC and Peak	200 Volts
Heater Negative with Respect to Cathode	
Total DC and Peak	200 Volts
Grid-Number 1 Circuit Resistance	
With Fixed Bias	0.25 Megohms
With Cathode Bias	0.5 Megohms

### BASING DIAGRAM

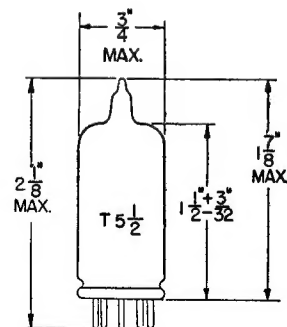


RETMA 7EN

### TERMINAL CONNECTIONS

- Pin 1—Grid Number 1
- Pin 2—Cathode and Internal Shield
- Pin 3—Heater
- Pin 4—Heater
- Pin 5—Plate
- Pin 6—Grid Number 2 (Screen)
- Pin 7—Grid Number 3 (Suppressor)

### PHYSICAL DIMENSIONS



RETMA 5-2

## CHARACTERISTICS AND TYPICAL OPERATION

### CLASS A<sub>1</sub> AMPLIFIER

Plate Voltage	150 Volts
Suppressor Voltage	0 Volts
Screen Voltage	100 Volts
Cathode-Bias Resistor	560 Ohms
Plate Resistance, approximate	0.15 Megohms
Grid-Number 1 Transconductance	800 Micromhos
Grid-Number 3 Transconductance	515 Micromhos
Plate Current	1.1 Milliampères
Screen Current	2.1 Milliampères
Grid-Number 1 Voltage, approximate	
I <sub>b</sub> = 10 Microampères	—4.5 Volts
Grid-Number 3 Voltage, approximate	
I <sub>b</sub> = 10 Microampères	—3.5 Volts

### 4.5-Megacycle FM Detector—See Circuit Diagram

RMS Input Signal to Grid to Driver Tube	15	200	500 Millivolts
Plate Supply Voltage	250	250	250 Volts
Suppressor Voltage (Obtained from a 560,000-ohm resistor)	—5.0	—6.0	—6.4 Volts
Screen Voltage	100	100	100 Volts
Cathode-Bias Resistor	560	560	560 Ohms
Plate Load Resistor	0.27	0.27	0.27 Megohms
Plate Current	0.23	0.22	0.21 Milliampères
Screen Current	3.4	5.5	6.0 Milliampères
Grid-Number 1 Current	0.013	0.6	0.8 Milliampères
Bandwidth			
For a Total Harmonic Distortion of 10 Percent	65	120	118 Kilocycles
AM Rejection†, approximate	33	29	28 Decibels
RMS Audio Output Voltage, approximate			
With $\pm 7.5$ -kc Deviation from Mean Value of 4.5 Megacycles	5.5	6.5	7.5 Volts
With $\pm 25$ -kc Deviation from Mean Value of 4.5 Megacycles	17	21	23 Volts
Total Harmonic Distortion, approximate			
With $\pm 25$ -kc Deviation from Mean Value of 4.5 Megacycles	2	3	4 Percent
Sensitivity			
With $\pm 7.5$ -kc Deviation from Mean Value of 4.5 Megacycles	5§		Millivolts
With $\pm 25$ -kc Deviation from Mean Value of 4.5 Megacycles	15§		Millivolts

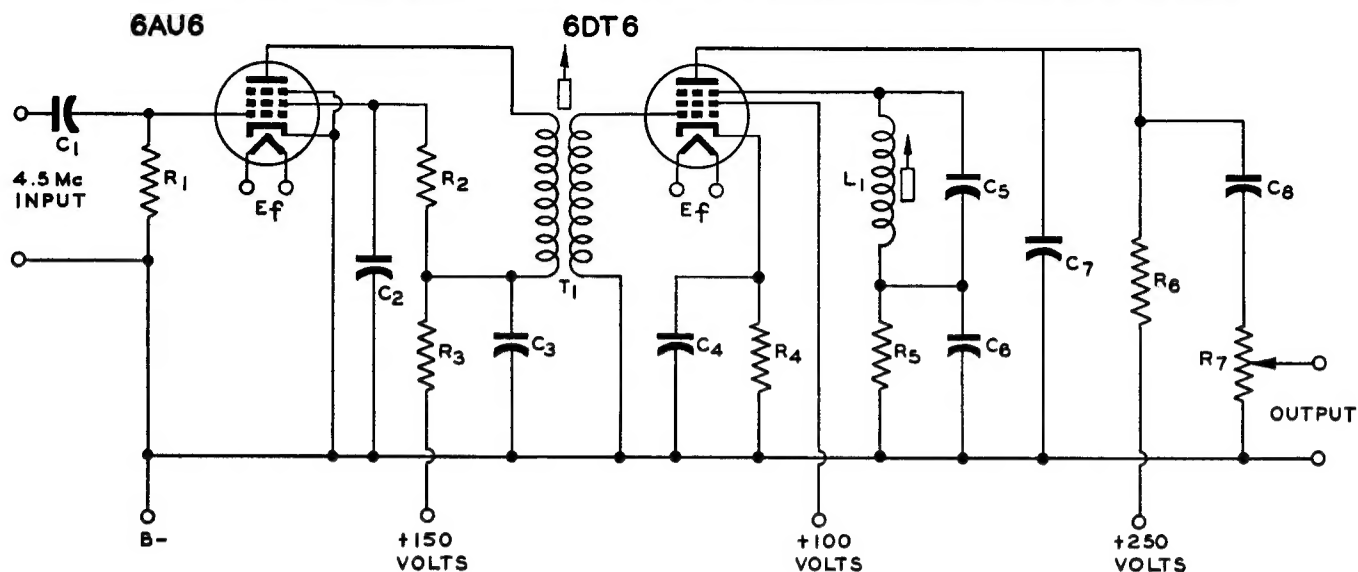
\* The time required for the voltage across the heater to reach 80 percent of its rated value after applying 4 times rated heater voltage to a circuit consisting of the tube heater in series with a resistance equal to 3 times the rated heater voltage divided by the rated heater current.

† With external shield (RETMA 316) connected to cathode.

‡ Ratio of the audio output voltage produced by 30-percent amplitude modulation of the 4.5-megacycle carrier frequency to the audio output voltage produced by  $\pm 25$ -kilocycle deviation from the 4.5-megacycle carrier frequency, with a modulating frequency of 400 cps in both cases.

§ Signal level at which detector circuit will handle the indicated deviation in frequency from the mean value of 4.5 megacycles before distortion occurs.

**LOCKED-OSCILLATOR, QUADRATURE-GRID DETECTOR CIRCUIT UTILIZING TYPE 6DT6 OR 3DT6**



C<sub>1</sub> - 47  $\mu$ f, 400 VOLTS  
 C<sub>2</sub> C<sub>3</sub> - 0.01  $\mu$ f, 400 VOLTS  
 C<sub>4</sub> - 0.01  $\mu$ f, 200 VOLTS  
 C<sub>5</sub> - 18  $\mu$ f, 200 VOLTS  
 C<sub>6</sub> - 0.05  $\mu$ f, 200 VOLTS  
 C<sub>7</sub> - 100 TO 1000  $\mu$ f, 400 VOLTS  
 C<sub>8</sub> - 0.01  $\mu$ f, 400 VOLTS

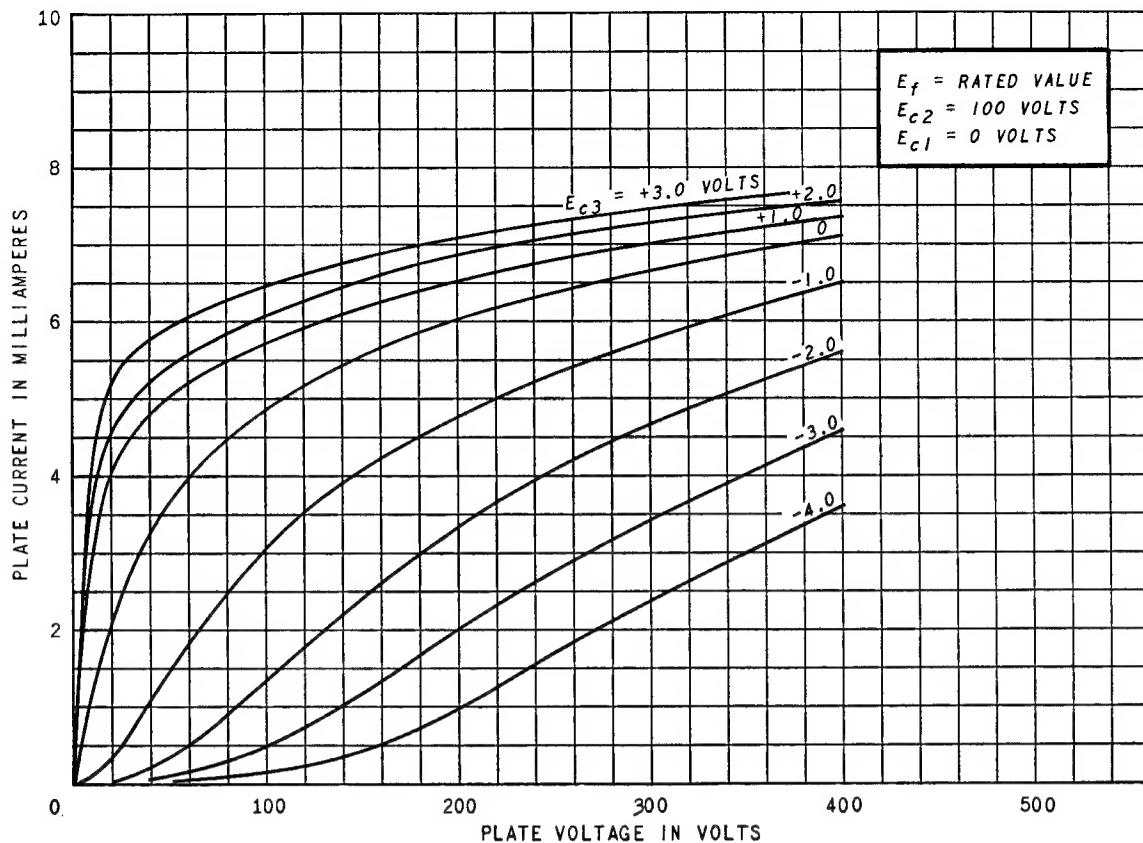
L<sub>1</sub> - SLUG-TUNED INDUCTOR WITH Q OF 50 AND TUNEABLE TO 4.5-MC  
 R<sub>1</sub> - 100000 OHMS, 0.5 WATT  
 R<sub>2</sub> - 12000 OHMS, 0.5 WATT  
 R<sub>3</sub> - 1000 OHMS, 0.5 WATT  
 R<sub>4</sub> - 560 OHMS, 0.5 WATT  
 R<sub>5</sub> - 560000 OHMS, 0.5 WATT

R<sub>6</sub> - 270000 OHMS, 0.5 WATT  
 R<sub>7</sub> - 0.5 MEGOHM POTENTIOMETER  
 T<sub>1</sub> - SLUG-TUNED, BIFILAR WOUND IF TRANSFORMER WITH RATIO OF 1:1.5, Q > 60, AND TUNEABLE TO 4.5-MC WITH TUBE AND WIRING CAPACITANCE

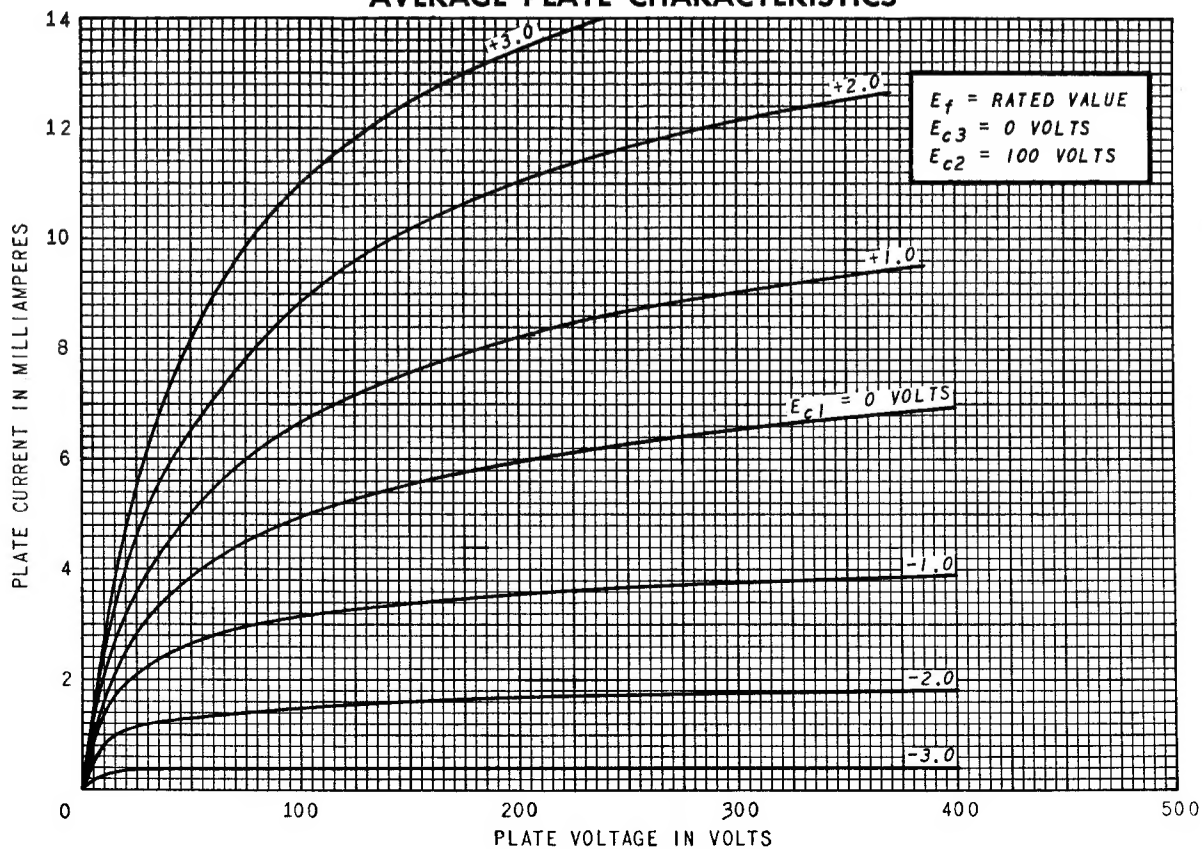
**RECOMMENDED ALIGNMENT PROCEDURE**

1. Feed a 500-millivolt, 4.5-mc, 400-cps FM-modulated ( $\pm 25$ -kc deviation) signal to the input of the driver tube.
2. Adjust L<sub>1</sub> for maximum undistorted sound output. Since several maxima may occur during this adjustment, it is important to select the proper one. This is the higher frequency peak and coincides with maximum voltage drop across R<sub>5</sub>.
3. Reduce the level of the 4.5-mc signal to 5 millivolts RMS.
4. Using an oscilloscope, adjust T<sub>1</sub> for a centered discriminator characteristic with oscillation beats at the edges. Alternatively, T<sub>1</sub> may be adjusted for maximum d-c voltage across R<sub>5</sub>.
5. Repeat steps 1 through 4 as necessary to assure accurate alignment.

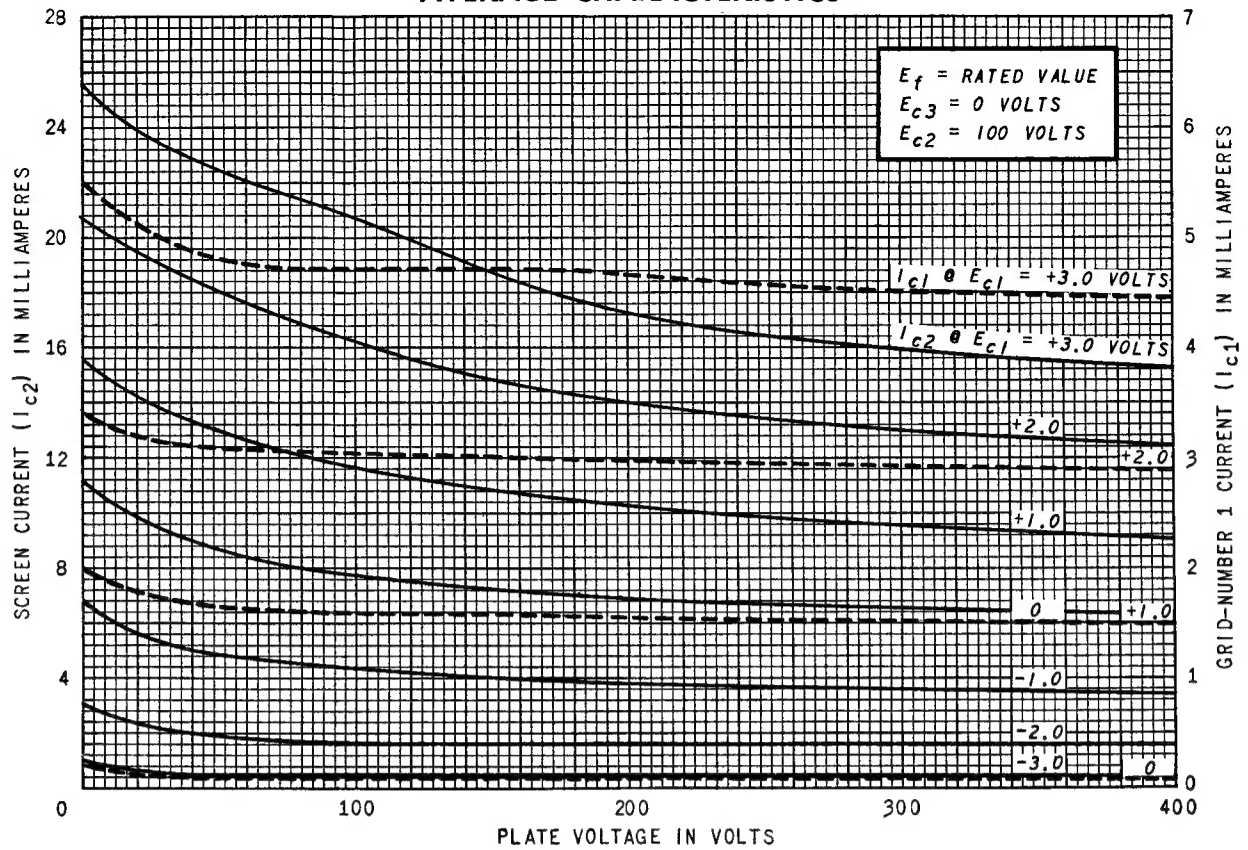
# AVERAGE PLATE CHARACTERISTICS



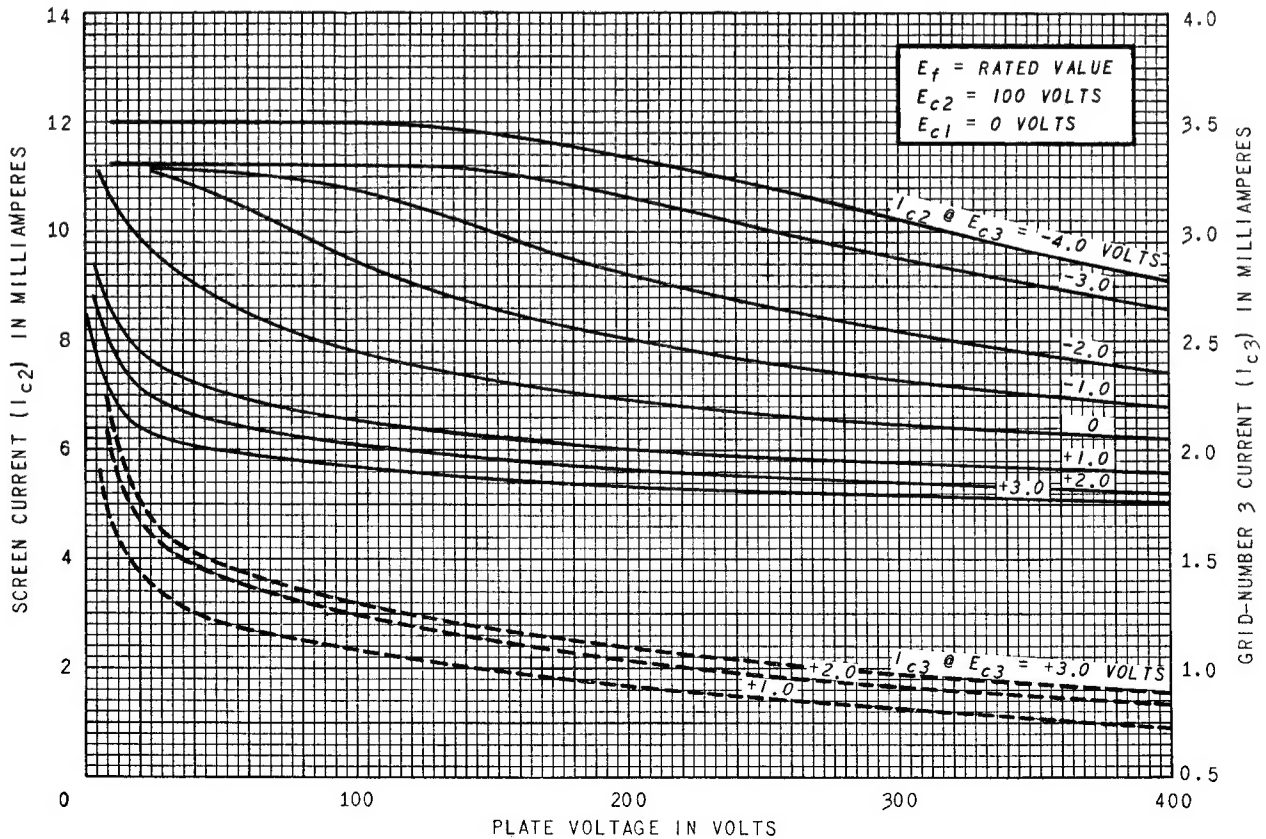
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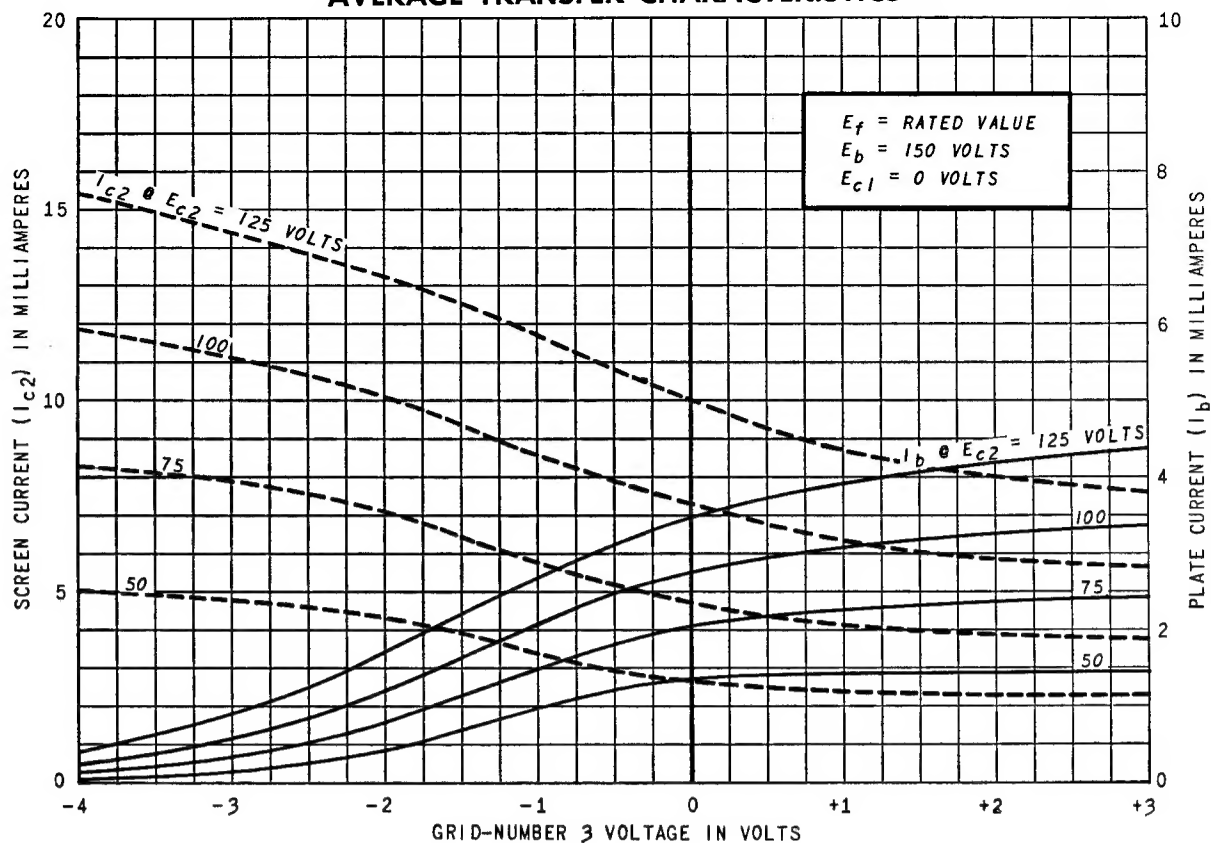
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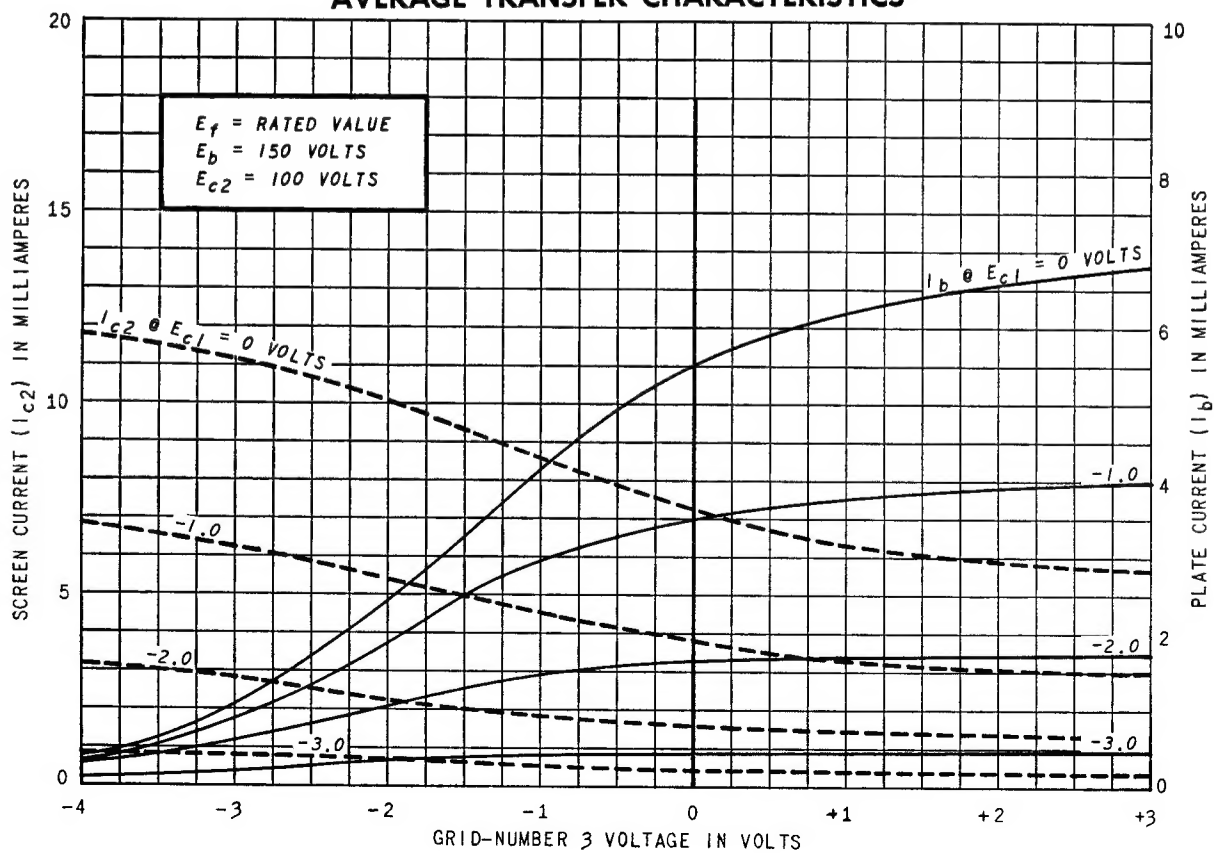
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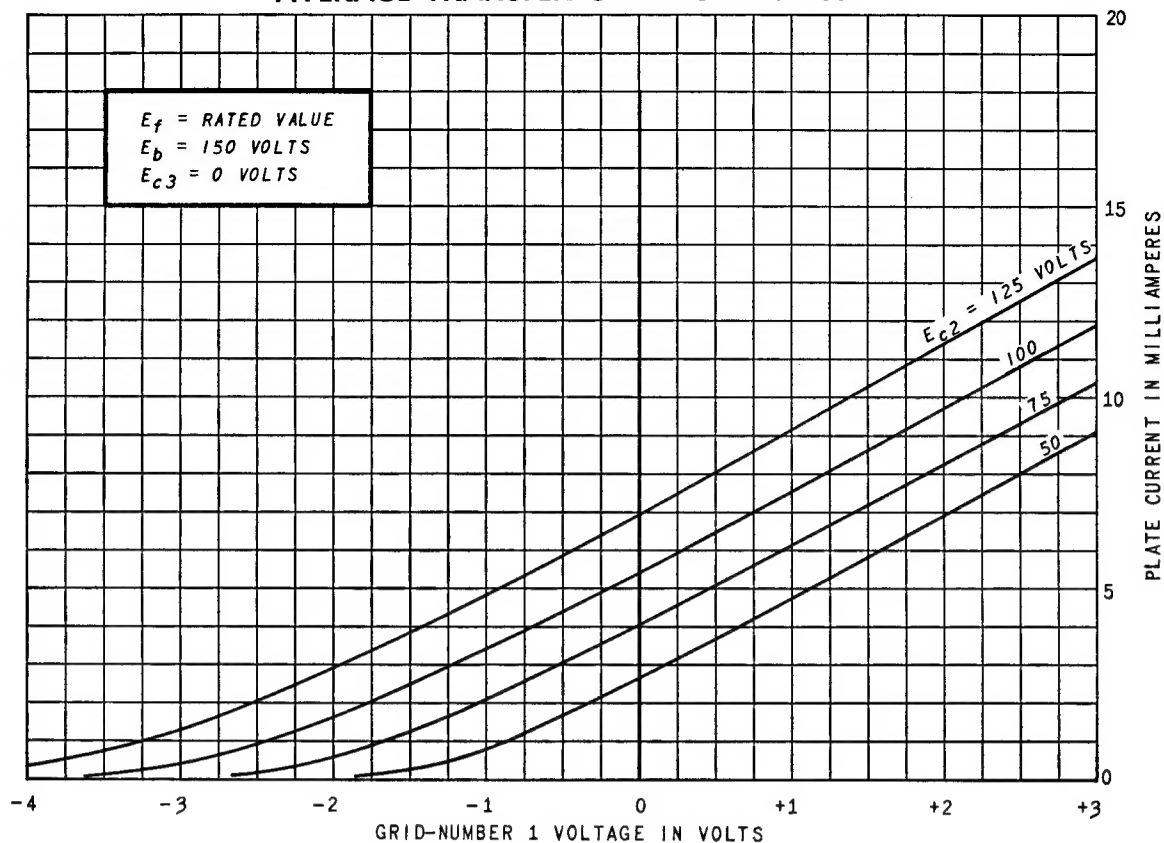
# AVERAGE TRANSFER CHARACTERISTICS



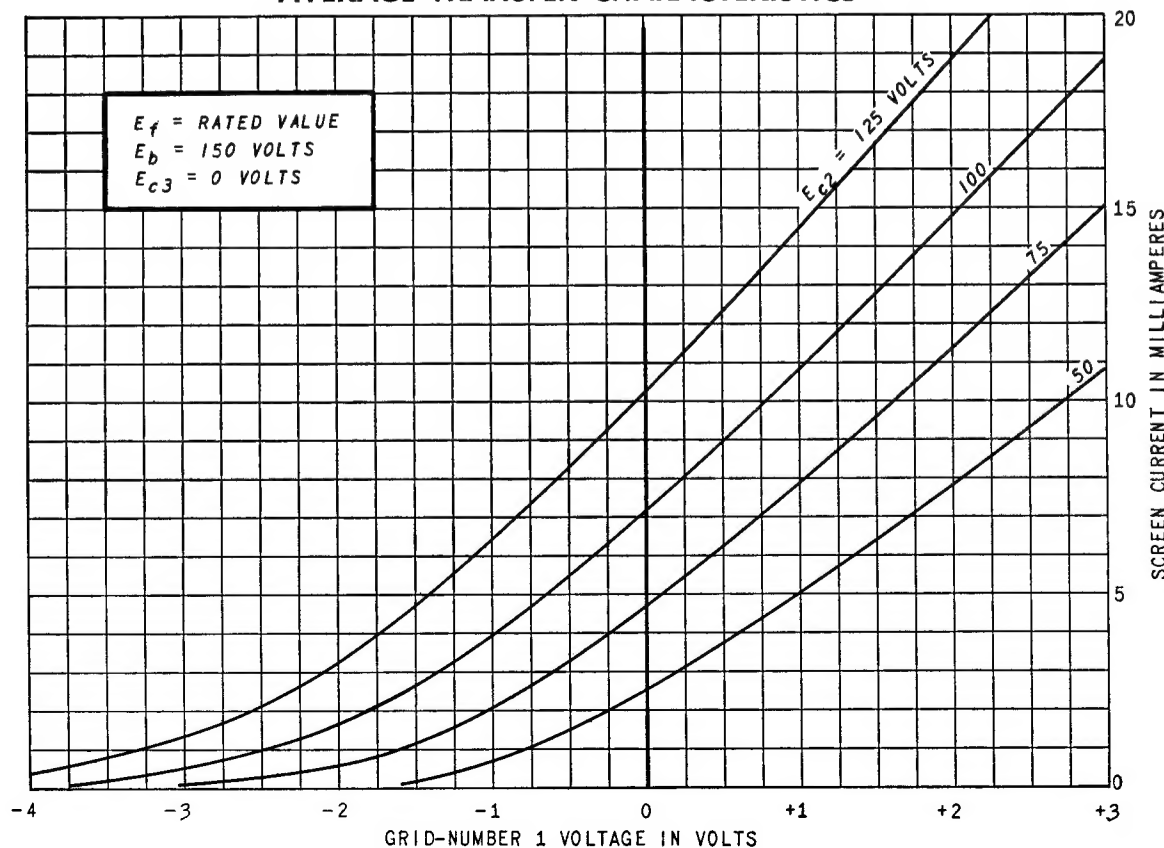
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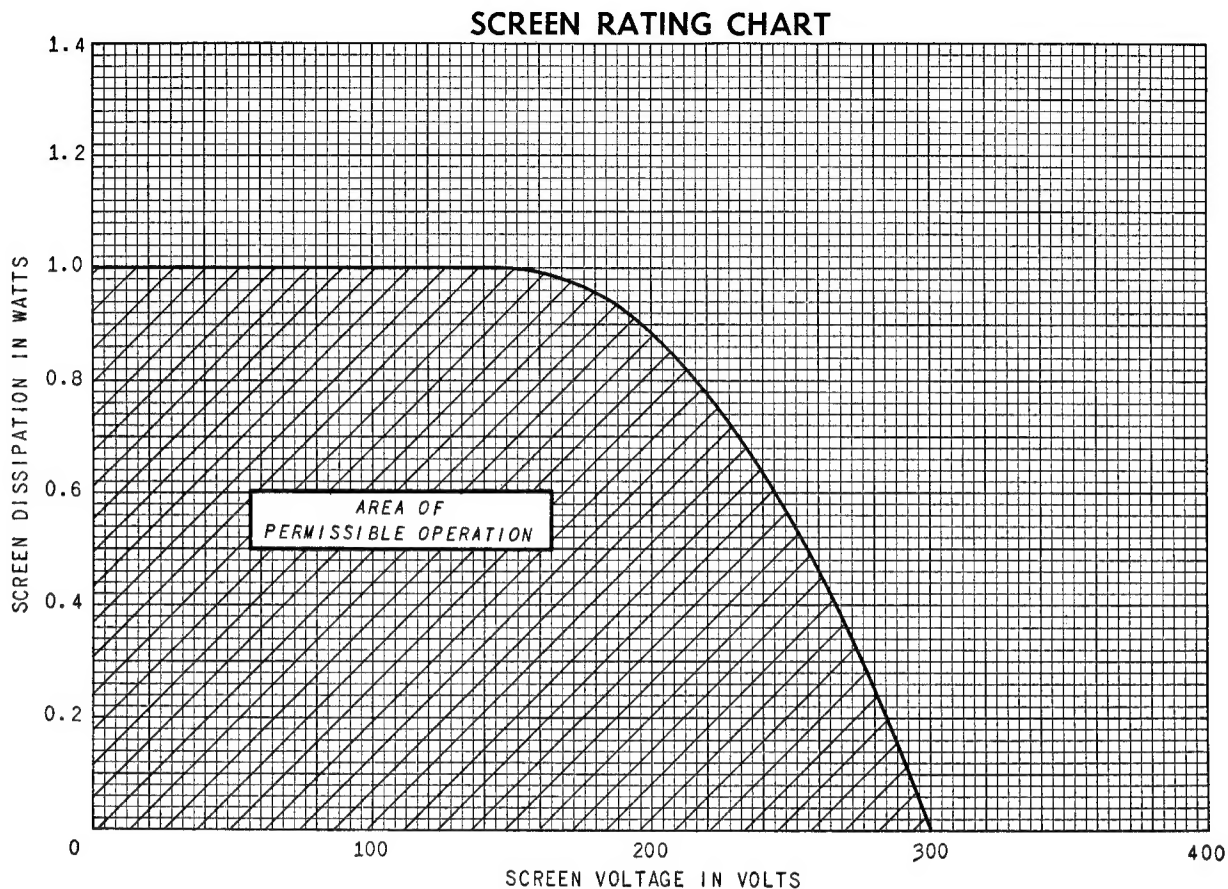
# AVERAGE TRANSFER CHARACTERISTICS



# AVERAGE TRANSFER CHARACTERISTICS







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